CLAIMS

The embodiments of an invention in which an exclusive property or right is claimed are defined as follows:

1. A system, comprising:

a physical neural network configured utilizing nanotechnology, wherein said physical neural network comprises a plurality of nanoconductors which form neural connections between pre-synaptic and post-synaptic components of said physical neural network; and

a learning mechanism for applying Hebbian learning to said physical neural network.

2. The system of claim 1 wherein said learning mechanism utilizes a voltage gradient to implement Hebbian plasticity within said physical neural network.

3. The system of claim 1 wherein said learning mechanism utilizes voltage gradient dependencies associated with physical neural network to implement Hebbian learning within said physical neural network.

4. The system of claim 1 wherein said learning mechanism utilizes pre-synaptic and post-synaptic frequencies to provide Hebbian learning within said physical neural network.

5. The system of claim 1 wherein said learning mechanism utilizes a voltage gradient to implement anti-Hebbian plasticity within said physical neural network.

6. The system of claim 1 wherein said learning mechanism utilizes voltage gradient dependencies associated with physical neural network to implement anti-Hebbian learning within said physical neural network.

7. The system of claim 1 wherein said learning mechanism utilizes pre-synaptic and post-synaptic frequencies to provide anti-Hebbian learning within said physical neural network.

8. The system of claim 1 wherein said plurality of nanoconductors includes nanoconductors comprising nanotubes.

9. The system of claim 1 wherein said plurality of nanoconductors includes nanoconductors comprising nanowires.

10. The system of claim 1 wherein said plurality of nanoconductors includes nanoconductors comprising nanoparticles.

11. A system, comprising:

a physical neural network configured utilizing nanotechnology, wherein said physical neural network comprises a plurality of nanoconductors which form neural connections between pre-synaptic and post-synaptic components of said physical neural network; and

a learning mechanism for applying Hebbian learning to said physical neural network wherein said learning mechanism utilizes a voltage gradient or pre-synaptic and post-synaptic frequencies thereof to implement Hebbian or anti-Hebbian plasticity within said physical neural network.

12. The system of claim 11 wherein said plurality of nanoconductors includes nanoconductors comprising nanotubes.

13. The system of claim 11 wherein said plurality of nanoconductors includes nanoconductors comprising nanowires.

14. The system of claim 11 wherein said plurality of nanoconductors includes nanoconductors comprising nanoparticles.

15. The system of claim 11 wherein said plurality of nanoconductors are disposed within a dielectric medium.

16. The system of claim 15 wherein said plurality of nanoconductors form physical neural connections when said dielectric medium is exposed an electric field, such that said physical neural connections can be strengthened or weakened depending upon a strengthening or weakening of said electric field or an alteration of a frequency thereof.

17. A system, comprising:

a plurality of molecular conductors disposed within a dielectric medium;

at least one input electrode in contact with said dielectric medium; and

at least one output electrode in contact with said dielectric medium, wherein said plurality of molecular conductors form physical neural connections when said dielectric medium is exposed an electric field across said at least one input electrode and said at least one output electrode, such that said physical neural connections can be strengthened or weakened depending upon a strengthening or weakening of said electric field or an alteration of a frequency thereof.

18. The system of claim 17 further comprising a physical neural network comprising said plurality of molecular conductors disposed within a dielectric medium, said at least one input electrode in contact with said dielectric medium, and said at least one output electrode in contact with said dielectric medium.

19. The system of claim 18 further comprising a learning mechanism for applying Hebbian learning to said physical neural network wherein said learning mechanism utilizes a voltage gradient or pre-synaptic and post-synaptic frequencies thereof to implement Hebbian or anti-Hebbian plasticity within said physical neural network.

20. The system of claim 18 wherein said physical neural network is configured as an integrated circuit chip utilizing nanotechnology.